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source of sounds, under the heading, "Have Birds an Acute Sense of Sound Location?" He closes by saying that he would appreciate any direct observational data touching upon this subject. The following is an affirmative answer to his question:

On the morning of September 9, 1921, when in camp near Kneeland post office, Humboldt County, California, while I was seated among some rather tall bushes, watching for sparrows, a Sharp-shinned Hawk (*Accipiter velox*) flew on to a lower limb, some thirty or forty feet above the ground, of a dead fir tree about seventy yards away, alighting with its back toward me. While the bird was visible to me through the small openings among the branches of the bushes I must have been absolutely hidden from its view.

Just to see what the result would be I squeaked in imitation of a wounded bird when, to my great astonishment, the hawk wheeled as if on a pivot with remarkable rapidity and darted in a bee line over the tops of the bushes straight in my direction. When it reached the spot directly over my head, and not six feet above me, it evidently was aware that it had reached the center of the sound field for, not seeing anything there to account for the sound, it shot abruptly up into the air and lit on a limb of another dead fir so close to me that I shot it with my 32 caliber auxiliary barrel with a small charge of No. 12 shot.

The most curious part of this incident is that the hawk did not stop to listen and analyze or locate the sound, as might a jay for instance, but with the first squeak it turned quick as a flash, and darted with arrowlike speed for the spot from which the sound emanated; that is to say on the exact line (more correctly, vertical plane) between its perch and the spot, as the height of the bushes prevented it from aiming its flight quite low enough. It seemed to me that if my head had been high enough to be above the bushes it would have struck me.

This was the most remarkable exhibition of instantaneous precision in locating sound, not only as concerns direction but also as to rapid-

ity of impulse, that it has been my good fortune to witness.

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## SCIENTIFIC BOOKS

*Déodat Dolomieu, membre de l'Institut National (1750-1801); sa correspondance, sa vie aventureuse, sa captivité, ses œuvres.* ALFRED LACROIX. Ouvrage publié par l'Académie des Sciences avec le concours de l'Institut (Fondations Debrousse et Gas) Paris, Librairie Académique, Perrin et Cie, 1921, 2 vols, lxxx, 255, and 322 pp., port., 8vo. With line portrait frontispiece.

THE latest work of Professor Alfred Lacroix is a very important contribution to the history of the scientific men of France in the eighteenth century, perhaps all the more so that the name of Dolomieu is not well known in foreign lands.

The book has grown out of the researches made by Professor Lacroix in preparing the biographical sketch of Dolomieu which he read before the Académie des Sciences on December 2, 1918, and which has already been reviewed in SCIENCE. He found a number of Dolomieu's letters in the library of the Muséum d'Histoire Naturelle, and traced out many others in foreign libraries and in private hands. The author remarks that the chief value of those letters he has selected for publication is that they include a series, covering a period of some twenty years, written by Dolomieu to a small number of particular friends, so that they enable the reader to follow his life day by day in its more intimate details. The earliest in date of these letters were addressed by Dolomieu to his patron, Duke Alexander de la Rochefoucauld, member of the Académie des Sciences and colonel of the regiment "De la Sarre," who was destined to be assassinated in 1792, almost in Dolomieu's arms.

An interesting group of 47 letters are those written to the Sicilian naturalist Giseni; these treat at length of the important investigations of Dolomieu in the domain of volcanic formations. Other groups of letters are those sent to

<sup>1</sup> SCIENCE, New Series, Vol. LIII, No. 1375, May 6, 1921, p. 439.

the Chevalier Philippe de Fay, the truest of Dolomieu's friends, to Picot de la Peyrouse, botanist and geologist of Toulouse, to the great geologist Saussure, to the Genevan physician Pictet, to Pierre Picot, professor of theology in Geneva, and to Frederic Munter, professor of theology in Copenhagen.

The following extract from a letter to this last named correspondent, is a characteristic example. Dolomieu, after passing safely through the throes of the French Revolution, was appointed, in 1796, lecturer in geology and the distribution of minerals at the newly-organized Ecole des Mines. A year later, Jan. 15, 1797, he writes to his friend Munter:<sup>1</sup>

"The sciences, which were for me formerly a relaxation, have become a profession which furnishes me the means of livelihood, and none the less I cultivate them with pleasure. I am chiefly occupied with mineralogy and geology, and I give lessons in these branches at the Ecole des Mines during the winter. During the summer I travel to inspect the mining operations. I have assumed charge of the mineralogical articles of the Dictionnaire Encyclopédique, and I write articles which are published in various journals. Thus I employ my time in a manner agreeable to myself and I advance without much disquietude toward that fatal term against which all human hopes make shipwreck. We have become so accustomed to the idea of death, that we now see our last hour approaching with complete indifference."

The biographical sketch already noted is reprinted by Professor Lacroix at the beginning of the first volume of the present work (pp. i—lxxx). To this succeeds the unique record written by Dolomieu in 1799, in his prison at Messina, where he was incarcerated because of his supposed guilt, as a Knight of Malta, in aiding Bonaparte to seize the island. It was inscribed on the margins of the leaves of a book he had succeeded in obtaining, and which is now a precious possession of the Muséum d'Histoire Naturelle (pp. 1-44). The quality of this record may be exemplified by the following brief extract:

"My passion for the phenomena of Nature

<sup>1</sup> Vol. II, p. 138.

was so strong that every year, when spring renewed the life of the vegetable kingdom and gave new force to all organized beings, the environs of Paris seemed too restricted for me, its atmosphere heavy and offensive . . . . Therefore each year I hastened to the mountains, and sought on their summits those profound emotions which the contemplation of very great objects always procures us . . . . Now, confined within a space of twelve feet long, and ten feet in height and width, I can only contemplate my own wretchedness and reflect upon the vicissitudes of fortune and my strange destiny."

Fortunately the Italian victories of Bonaparte opened his prison doors, his liberty being prescribed in one of the articles of the peace treaty of Florence, March 20, 1801. However, his enfeebled health did not long permit him to enjoy his recovered freedom. He died at Chateaufort, November 6, 1801, but fifty-one years old.

Of Dolomieu's scientific attainments, Professor Lacroix notes that it was principally in the study of volcanic phenomena that he left his trace, and asserts that by his researches concerning Auvergne, he takes his place in the first rank of those who have recognized and demonstrated the relations existing between volcanism and the internal heat of the earth.

GEORGE F. KUNZ

## SPECIAL ARTICLES

### DISSOCIATION OF HYDROGEN IN A TUNGSTEN FURNACE AND LOW VOLTAGE ARCS IN THE MONATOMIC GAS

IN the course of an investigation of arcing characteristics of diatomic gases being carried on in this laboratory, it was found that the arc between a hot tungsten filament and a plate anode in hydrogen struck and broke at a minimum of 16.4 volts. This potential is about that ascribed by Bohr's theory to the potential necessary to accelerate an electron so that it will dissociate the molecule and ionize one of the atoms upon impact. In view of the fact that Bohr's theory puts the ionizing potential of the hydrogen atom at 13.52 volts